The resulting mixture of hydrophobically modified guar and surfactant was tested for compatibility with salt by measuring the viscosity as increasing amounts of KCl were added. The results are shown in Table 3 below. The gel viscosity appears insensitive to KCl additions until levels of about 4 to 5 percent are reached. At this point the viscosity drops but remains above the level obtained without surfactant.

Table 3. Effect of KCl Addition on Gel Viscosity

KCl %	**Gel Temp. ° F**	**Viscosity cP**
0.1	7.8	72.0
0.2	77.3	73.0
0.3	77.2	75.0
0.4	76.8	78.0
0.5	76.6	79.0
0.75	76.2	79.0
1.0	75.6	80.0
2.0	75.3	76.0
3.0	74.9	71.0
4.0	73.9	66.0
5.0	72.2	59.0
6.0	71.4	53.0
7.0	71.0	50.0
8.0	70.5	48.6
9.0	69.7	46.0
10.0	69.3	45.4
20.0	69.0	41.5

Thus, the present invention is well adapted to carry out the objects and attain the ends and advantages mentioned as well as those that are inherent therein. While numerous changes can be made by those skilled in the art, such changes are encompassed within the spirit of this invention as defined by the appended claims.

What is claimed is:

1. A method of treating a subterranean formation penetrated by a well bore that comprises the steps of:

(a) preparing or providing an aqueous treating fluid composition comprising water, a water soluble hydrophobically modified gelling agent polymer produced by grafting a low concentration of hydrophobic monomers onto said gelling agent polymer, and a low concentration of an ionic surfactant the hydrophobic chain portion of which is associated with said hydrophobic monomers grafted onto said gelling agent polymer resulting in gelling agent polymer molecules having increased radiuses of gyration; and

(b) pumping said aqueous treating fluid composition into said subterranean formation.

2. The method of claim 1 wherein said water is selected from the group consisting of fresh water and salt water.

3. The method of claim 1 wherein said hydrophobic monomers grafted onto said hydrophobically modified gelling agent polymer comprise at least two different alkyl substituents wherein the first alkyl substituent is selected from the group consisting of R and HOR^1 wherein R is an alkyl group containing from 1 to about 4 carbon atoms and R^1 is an alkylene group containing from about 2 to about 4 carbon atoms and the OH group is on the carbon atom beta to the ether group, and the second alkyl substituent is selected from the group consisting of R^2, HOR^3 and

$$\begin{array}{c} R^4OCH_2C{-}CH_2{-} \\ \quad | \\ \quad OH \end{array}$$

wherein R^2 is an alkyl group containing from about 8 to about 28 carbon atoms, R^3 is an alkylene group containing from about 8 to about 28 carbon atoms and the OH group is on the carbon atom beta to the ether group, and R^4 is an alkyl group containing from about 5 to about 25 carbon atoms, wherein the substituent R or HOR^1 is present in a molecular substitution of from about 0.3 to about 1.5 and wherein the substituent R^2, HOR^3 or

$$R^4OCH_2\underset{\displaystyle OH}{\underset{|}{C}}-CH_2-$$

is present in a molecular substitution of from about 0.001 to about 0.2.

4. The method of claim 1 wherein said gelling agent polymer is a biopolymer selected from the group consisting of xanthan and succinoglycon.

5. The method of claim 1 wherein said gelling agent polymer is a water dispersible organic polymer selected from the group consisting of polyvinyl alcohol, polyacrylamide, polyacrylate and polyacrilamide/acrylic acid copolymers.

6. The method of claim 1 wherein said gelling agent polymer is a polysaccharide selected from the group consisting galactomannan gums, derivative galactomannan gums and cellulose derivatives.

7. The method of claim 6 wherein said galactomannan gum is selected from the group consisting of guar gum, gum arabic, gum ghatti, gum karaya, tamarind gum and locust bean gum.

8. The method of claim 6 wherein said derivatized galactomannan gum is selected from the group consisting of carboxyalkyl and hydroxyalkyl derivatives of guar.

9. The method of claim 6 wherein said cellulose derivative is selected from the group consisting of carboxymethylcellulose, carboxymethylhydroxyethylcellulose, hydroxyethylcellulose, methylhydroxypropylcellulose, methylcellulose, ethylcellulose, propylcellulose, ethylcarboxymethylcellulose, methylethylcellulose, hydroxypropylmethylcellulose.

10. The method of claim 1 wherein said hydrophobically modified gelling agent polymer is present in said treating fluid composition in an amount in the range of from about 20 to about 60 lbs per 1000 gal of said composition.

11. The method of claim 1 wherein said ionic surfactant is an anionic surfactant selected from the group consisting of sodium lauryl sulfate, alpha olefin sulfonate, alkylether sulfates, alkyl phosphonates, alkane sulfonates, fatty acid salts, and arylsulfonic acid salts, and mixtures thereof.

12. The method of claim 1 wherein said ionic surfactant is a cationic surfactant selected from the group consisting of trimethylcocoammonium chloride, trimethyltallowammonium chloride, dimethyldicocoammonium chloride, bis(2-hydroxyethyl)tallow amine, bis(2-hydroxyethyl)erucylamine, bis(2-hydroxyethyl)coco-amine, cetylpyridinium chloride, and mixtures thereof.

13. The method of claim 1 wherein said ionic surfactant is present in said treating fluid composition in an amount in the range of from about 0.01% to about 0.025% by weight of said composition.

14. The method of claim 1 wherein said aqueous treating fluid composition further comprises a crosslinking agent.

15. The method of claim 14 wherein said crosslinking agent is selected from the group consisting of boron compounds, compounds that supply zirconium IV ions, compounds that supply titanium IV ions, aluminum compounds and compounds that supply antimony ions.

16. The method of claim 14 wherein said crosslinking agent is present in said aqueous treating fluid composition in an amount in the range of from about 4 lbs to about 40 lbs per 1000 gallons of said aqueous treating fluid composition.

17. A method of fracturing a subterranean formation penetrated by a well bore comprising the steps of:

(a) preparing or providing an aqueous fracturing fluid composition comprising water, a water soluble hydrophobically modified gelling agent polymer produced by grafting a low concentration of hydrophobic monomers onto said gelling agent polymer, and a low concentration of an ionic surfactant the hydrophobic chain portion of which is associated with said hydrophobic monomers grafted onto said gelling agent polymer resulting in gelling agent polymer molecules having increased radiuses of gyration; and

(b) pumping said fracturing fluid composition into said subterranean formation at a rate and pressure sufficient to form one or more fractures therein.

18. The method of claim 17 wherein said water is selected from the group consisting of fresh water and salt water.

19. The method of claim 17 wherein said hydrophobic monomers grafted onto said hydrophobically modified gelling agent polymer comprise at least two different alkyl substituents wherein the first alkyl substituent is selected from the group consisting of R and HOR^1 wherein R is an alkyl group containing from 1 to about 4 carbon atoms and R^1 is an alkylene group containing from about 2 to about 4 carbon atoms and the OH group is on the carbon atom beta to the ether group, and the second alkyl substituent is selected from the group consisting of R^2, HOR^3 and

$$\begin{array}{c} R^4OCH_2\underset{\displaystyle OH}{\underset{|}{C}}—CH_2— \end{array}$$

wherein R^2 is an alkyl group containing from about 8 to about 28 carbon atoms, R^3 is an alkylene group containing from about 8 to about 28 carbon atoms and the OH group is on the carbon atom beta to the ether group, and R^4 is an alkyl group containing from about 5 to about 25 carbon atoms, wherein the substituent R or HOR^1 is present in a molecular substitution of from about 0.3 to about 1.5 and wherein the substituent R^2, HOR^3 or

$$\begin{array}{c} R^4OCH_2\underset{\displaystyle OH}{\underset{|}{C}}—CH_2— \end{array}$$

is present in a molecular substitution of from about 0.001 to about 0.2.

20. The method of claim 17 wherein said gelling agent polymer is a biopolymer selected from the group consisting of xanthan and succinoglycon.

21. The method of claim 17 wherein said gelling agent polymer is a water dispersible organic polymer selected from the group consisting of polyvinyl alcohol, polyacrylamide, polyacrylate andpolyacrilamide/acrylic acid copolymers.

22. The method of claim 17 wherein said gelling agent polymer is a polysaccharide selected from the group consisting galactomannan gums, derivative galactomannan gums and cellulose derivatives.

23. The method of claim 22 wherein said galactomannan gum is selected from the group consisting of guar gum, gum arabic, gum ghatti, gum karaya, tamarind gum and locust bean gum.

24. The method of claim 22 wherein said derivatized galactomannan gum is selected from the group consisting of carboxyalkyl and hydroxyalkyl derivatives of guar.

25. The method of claim 22 wherein said cellulose derivative is selected from the group consisting of carboxymethylcellulose, carboxymethylhydroxyethylcellulose, hydroxyethylcellulose, methylhydroxypropylcellulose, methylcellulose, ethylcellulose, propylcellulose, ethylcarboxymethylcellulose, methylethylcellulose, hydroxypropylmethylcellulose.

26. The method of claim 17 wherein said hydrophobically modified gelling agent polymer is present in said fracturing fluid composition in an amount in the range of from about 20 to about 60 lbs per 1000 gal of said compositoin.

27. The method of claim 17 wherein said ionic surfactant is an anionic surfactant selected from the group consisting of alpha olefin sulfonate, alkylether sulfates, alkyl phosphonates, alkane sulfonates, fatty acid salts, and arylsulfonic acid salts, and mixtures thereof.

28. The method of claim 17 wherein said ionic surfactant is a cationic surfactant selected from the group consisting of trimethylcocoammonium chloride, trimethyltallowammonium chloride, dimethyldicocoammonium chloride, bis(2-hydroxyethyl)tallow amine, bis(2-hydroxyethyl)erucylamine, bis(2-hydroxyethyl)coco-amine, cetylpyridinium chloride, and mixtures thereof.

29. The method of claim 17 wherein said ionic surfactant is present in said treating fluid composition in an amount in the range of from about 0.01% to about 0.025% by weight of said composition.

30. The method of claim 17 wherein said aqueous treating fluid composition further comprises a crosslinking agent.

31. The method of claim 30 wherein said crosslinking agent is selected from the group consisting of boron compounds, compounds that supply zirconium IV ions, compounds that supply titanium IV ions, aluminum compounds and compounds that supply antimony ions.

32. The method of claim 30 wherein said crosslinking agent is present in said aqueous treating fluid composition in an amount in the range of from about 2 lbs to about 40 lbs per 1000 gallons of said aqueous treating fluid composition.

33. An aqueous treating fluid composition for treating a subterranean formation comprising:

water;

a water soluble hydrophobically modified gelling agent polymer produced by grafting a low concentration of hydrophobic monomers onto said gelling agent polymer; and

a low concentration of an ionic surfactant the hydrophobic chain portion of which is associated with said hydrophobic monomers grafted onto said gelling agent polymer resulting in gelling agent polymer molecules having increased radiuses of gyration.

34. The composition of claim 33 wherein said water is selected from the group consisting of fresh water and salt water.

35. The composition of claim 33 wherein said hydrophobic monomers grafted onto said hydrophobically modified gelling agent polymer comprise at least two different alkyl substituents wherein the first alkyl substituent is selected from the group consisting of R and HOR^1 wherein R is an alkyl group containing from 1 to about 4 carbon atoms and R^1 is an alkylene group containing from about 2 to about 4 carbon atoms and the OH group is on the carbon atom beta to the ether group, and the second alkyl substituent is selected from the group consisting of R^2, HOR^3 and

$$\begin{array}{c} R^4OCH_2\underset{\displaystyle OH}{\underset{|}{C}}\!-\!CH_2\!- \end{array}$$

wherein R^2 is an alkyl group containing from about 8 to about 28 carbon atoms, R^3 is an alkylene group containing from about 8 to about 28 carbon atoms and the OH group is on the carbon atom beta to the ether group, and R^4 is an alkyl group containing from about 5 to about 25 carbon atoms, wherein the substituent R or HOR^1 is present in a molecular substitution of about 0.3 to about 1.5 and wherein the substituent R^2, HOR^3 or

$$\begin{array}{c} R^4OCH_2\underset{\displaystyle OH}{\underset{|}{C}}\!-\!CH_2\!- \end{array}$$

is present in a molecular substitution of from about 0.001 to about 0.2.

36. The composition of claim 33 wherein said gelling agent polymer is a biopolymer selected from the group consisting of xanthan and succinoglycon.

37. The composition of claim 33 wherein said gelling agent polymer is a water dispersible organic polymer selected from the group consisting of polyvinyl alcohol, polyacrylamide, polyacrylate andpolyacrilamide/acrylic acid copolymers.

38. The composition of claim 33 wherein said gelling agent polymer is a polysaccharide selected from the group consisting galactomannan gums, derivative galactomannan gums and cellulose derivatives.

39. The composition of claim 38 wherein said galactomannan gum is selected from the group consisting of guar gum, gum arabic, gum ghatti, gum karaya, tamarind gum and locust bean gum.

40. The composition of claim 38 wherein said derivatized galactomannan gum is selected from the group consisting of carboxyalkyl and hydroxyalkyl derivatives of guar.

41. The composition of claim 38 wherein said cellulose derivative is selected from the group consisting of carboxymethylcellulose, carboxymethylhydroxyethylcellulose, hydroxyethylcellulose, methylhydroxypropylcellulose, methylcellulose, ethylcellulose, propylcellulose, ethylcarboxymethylcellulose, methylethylcellulose, hydroxypropylmethylcellulose.

42. The composition of claim 33 wherein said hydrophobically modified gelling agent polymer is present in said composition in an amount in the range of from about 20 to about 60 lbs per 1000 gal of said composition.

43. The composition of claim 33 wherein said ionic surfactant is an anionic surfactant selected from the group consisting of sodium lauryl sulfate, alpha olefin sulfonate, alkylether sulfates, alkyl phosphonates, alkane sulfonates, fatty acid salts, and arylsulfonic acid salts, and mixtures thereof.

44. The composition of claim 33 wherein said ionic surfactant is a cationic surfactant selected from the group consisting of trimethylcocoammonium chloride, trimethyltallowammonium chloride, dimethyldicocoammonium chloride, bis(2-hydroxyethyl)tallow amine, bis(2-hydroxyethyl)erucylamine, bis(2-hydroxyethyl)coco-amine, cetylpyridinium chloride, and mixtures thereof.

45. The composition of claim 33 wherein said ionic surfactant is present in said treating fluid composition in an amount in the range of from about 0.01% to about 0.025% by weight of said composition.

46. The composition of claim 33 wherein said aqueous treating fluid composition further comprises a crosslinking agent.

47. The composition of claim 46 wherein said crosslinking agent is selected from the group consisting of boron compounds, compounds that supply zirconium IV ions, compounds that supply titanium IV ions, aluminum compounds and compounds that supply antimony ions.

48. The composition of claim 46 wherein said crosslinking agent is present in said aqueous treating fluid composition in an amount in the range of from about 2 lbs to about 40 lbs per 1000 gallons of said aqueous treating fluid composition.